Mecheleciv

Volume 25 December - 1966 No. 3

oh joy

THE GEORGE WASHINGTON UNIVERSITY

DECEMBER 1966

Go Westinghouse, Young Man!

A modern fable with technical overtones.

There once was a college senior named Arthur King who more than anything wanted to pursue a course of excellence in life.

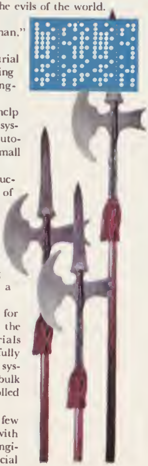
But which course? Should he go into government work, or enlist in a protest movement, or go on to graduate school, or join a small company, or . . .

Even Dr. Merlin, an eccentric professor, who'd been like a father to Arthur, was stumped for an answer.

Then Arthur met Mr. Greeley, the recruiter from Westinghouse.

Mr. Greeley was a kindly man with a warm smile, and he explained that, by joining forces at Westinghouse with other young men of the realm, Arthur could spearhead efforts to combat the evils of the world.

Mr. Greeley urged Arthur: "Go Westinghouse, young man." And Arthur did.



He elected to join the Industrial Group, one of six large operating organizations within Westinghouse.*

Arthur's first assignment: help develop a process computer system that would completely automate a big steel mill in a small European country.

The project was a decided success, providing the economy of the little nation with a much-needed shot in the arm.

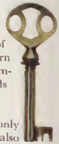
Though a grateful citizenry wanted to reward young Arthur, he modestly singled out as more deserving his friend and colleague Val, a prince of an engineer.

Val was already renowned for his part in helping develop the famous Westinghouse materials handling systems—including fully automated refuse reclamation systems, ship to shore and other bulk handling, and computer-controlled warehouses.

Back in the states only a few hours, Arthur and Val, along with a determined band of project engineers, were given another special assignment—this one by a large city in the South. The mayor and his councilors wanted to transport people more efficiently in and around a futuristic new international airport. The advanced concept was designed to reduce the walking distance of passengers between the planes and the air terminal. Officials asked pointedly for Arthur's group to help develop this transportation system.

Many were the nights that Arthur and his men worked 'round a table strewn with blueprints and calculations.

It was hard work, but it was good work.



Finally the day arrived for the unveiling of this Skybus . . . a series of sleek, ultramodern passenger cars riding on rubber wheels and computer-controlled to accommodate the thousands of passengers entering and leaving the greater metropolitan area airport.

At dedication ceremonies, the mayor not only gave Westinghouse the keys to the city. He also gave to Arthur the hand of his fair maiden daughter, Guinevere. Warm-hearted young Guinevere was also technically oriented and had served as a consulting engineer with her father's planning commission.

Guinevere made plans to work at the Westinghouse Standard Control Division where a complete line of electrical distribution equipment—bus duct, breakers, circuit devices, motor controls—is manufactured. Incidentally, women are welcome at Westinghouse, an equal opportunity employer.

Together, Arthur and Guinevere helped coordinate the increasing number of Westinghouse turnkey projects being applied to the cities of America, obtaining in the process their fair share of the coin of the realm.

And they lived happily ever after.

MORAL: By joining Westinghouse, you too can slay the dragons that beset modern society, and, in company with other stout hearts, win yourself a fair maiden.

You can be sure if it's Westinghouse

For further information, contact the Mr. Greeley who'll be visiting your campus in weeks to come or write: L. H. Noggle, Westinghouse Education Center, Pittsburgh, Pennsylvania 15221.

*Westinghouse is looking for bright young men and women for these widely varied operating groups: Consumer Products / Industrial / Construction / Electronic Components & Specialty Products / Atomic, Defense & Space / Electric Utility

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MECHELECIV

Art and the Engineer

An engineered object, no matter how large or small and regardless of precision, cannot be a success unless it is accepted by the public. The engineer has many means by which he may sell his product ranging from door to door sales to Madison Avenue techniques. Whatever his means of selling the product, the success of the product may depend on its appearance to the layman. This layman does not appreciate the thought and planning that the engineer has done on the inside, but looks only at the external aspects of the object.

If the engineer wants to make his product more likely to succeed he must incorporate a pleasing exterior into his design. At this point the engineer must assume the role of an artist and try to develop a design which will be pleasing to the layman as well as functional. In recent years the "Artist's Conception" has been used as the exterior. This produces a design which is often gaudy, ridiculous, or non-functional. The engineer should make sure that his masterpiece is not being covered up by someone who thrives on fads and the unusual. Variation is desirable, but it should be kept on a level such that it will not overshadow the masterpiece that it covers.

Art is a personal talent which may be developed. Some people may be better than others, but this is probably because they have had more practice. Since it is the engineer's product that is being sold, the engineer should try to gain some artistic ability. The engineer should use any means available to him to make his product a masterpiece both inside and out.

--A.S.D.

the Mecheleciv

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ARTICLES

page

DEPARTMENTS

COVER:

Saint Nick; from a Christmas Card by Maidee of Georgetown.

FRONTISPIECE:

Dean Mason accepts the Trophy for the Engineers' Homecoming float from Bud Warham while organizers Doug Lowe and Stacy Deming look on. For more float pictures see pages 20 and 21.

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LETTERS TO

To the Editor:

After reading John Lindsey's open letter to the Editor in the November issue of the Mecheleciv, I offer the following comments in answer to some of the questions posed.

I believe that we all agree that it takes professionalism and leadership to develop professionalism and leadership among others. However, even in the presence of the above qualities, they cannot be assimilated by mere exposure, but must be worked for by the students themselves. I do feel that there is a basic core of professionalism and leadership both among the faculty and in the student body; this forms a basis from which to work. It is our obligation as students to foster the qualities in question by our active participation in student chapters of the three professional societies, the ASCE, ASME and IEEE, and any other organizations or projects within the SEAS that are available. If the student body shows a real desire for development of professionalism and active leadership, can official support and recognition be denied? As stated before, these qualities are not to be bought, nor do they come easily. They must be earned.

We as students (or our parents) are paying a large amount for our engineering education. This cannot be denied. Therefore, we are obligated to and have a right to get the most out of it that we possibly can. But we should also be aware that engineering education is going through an evolutionary process.

Three years ago the American Society for Engineering Education (ASEE) was requested by the Engineers Council for Professional Development (ECPD) to take a critical look at engineering education and its probable needs for the future. Their report was published in a recent issue of Engineering Education. I feel that the greater part of their findings and conclusions are applicable here at The George Washington University School of Engineering and Applied Science.

According to the article, the basic dilemma uncovered to date is that engineering educators have been trying to proceed in two directions at once -- toward singleness of purpose and professional unity on the one hand, and broadening, diversity, and fragmentation on the other.

It was admitted that diversity is a dominant force in engineering education, even a highly desirable characteristic. The report charged that, like it or not, engineering educators must realize that the typical four-year engineering course has gradually become the scientific and technical equivalent of a liberal arts program and that the

Kastner -- Page 13, Col. 1

Letter to the Editor:

In the November Issue of MECHELECIV John Lindsey asked questions which have indubitably been bothering many people for quite some time. Similar questions bother me. I would have phrased them differently, but they would still be about professionalism, the quality of our technical and non-technical education, student leadership, and the guidance and support from the dean and faculty. Mr. Lindsey's experience leads him to certain conclusions. In general, I find that I agree with him. However, rather than making comments on his letter, I would like to make a few observations on the school and offer possible solutions to some of our problems. Perhaps you have better answers.

Before any organization can effectively achieve its purpose it must be able to communicate both with individuals outside the organization and with persons and groups within the organization. I do not believe that the exchange of information between the faculty and the students is as effective as it could be. Nor has there been a sufficient exchange of information among the students themselves.

How can we bring about a greater flow of information so that there will not be so many contradictory rumors? First, students, professors, department chairmen and the dean could use MECHELECIV as the primary media for announcing significant changes in the school. They could also discuss such questions as new ideas in engineering education, where is the school headed and what we can do to improve it.

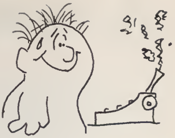
Another possibility would be to call school wide assemblies to make announcements and conduct special programs. The programs should be interesting enough to attract the student without coercion. Nationally prominent engineers and scientists might be invited to speak.

During the past four years one of the causes for less information getting to the students may have been the lack of a departmentalized school. It has probably been difficult for the student, and possibly the professor, to identify with a group. It is hoped that the departments will be able to keep the student informed about changes affecting his education. The departments should make greater faculty-student cooperation possible.

There is a need for free exchange of information and ideas between the faculty and students. There has been little of this for over a year. I think that open forums could fill this need

Young -- Page 13, Col. 2

THE EDITOR



To the Editor:

In regards to Mr. John Lindsey's letter (Mecheleciv, November 1966), some further comments must be made on the state of the School of Engineering and Applied Science.

For question one, I must agree that there has been little attempt to show how an engineering education relates to what is occurring outside Tompkins Hall.

The Washington area is not noted for heavy industries or industrial complexes where an undergraduate can be impressed by giant facilities. But there are numerous government and industrial labs where an undergraduate can get some idea of practical application of his education.

I don't mean for a tourist's look at these facilities but an engineer's viewpoint of actual problems and equipment. I admit that the undergraduate will hardly understand in a few hours what an engineer has been working on for months or years, but at least the undergraduate sees theory being used. Unfortunately, someone is going to have to arrange these trips whether it be faculty or students. Neither has shown the initiative or the interest so far.

As for Mr. Lindsey's second question, I must again agree that professionalism is sadly lacking here. The freshman hears about professionalism in the dean's address and then no more until after graduation.

Very few undergraduates initially or even now know of the extensive licensing procedures to be a registered engineer. Very few undergraduates realize where they stand with respect to the law, to their jobs, and to their profession by being a licensed or unlicensed engineer. Just the concept of the license should indicate that the engineer is a professional.

An obvious place to introduce professionalism is in the freshman courses. This means more work not only for the faculty but for the freshman. But at least the freshman is aware of the responsibilities, ethics, attitude, and meaning of the engineering profession.

As for the third question, leadership and responsibility is not being brought out in the school. This is not only the fault of the faculty as Mr. Lindsey seems to indicate, but it is also the fault of the student organizations or more to the point poor organization. Many engineering

Hum, Page 26, Col. 1

Letter to the Editor:

Last month I wrote an open letter which I hope caused many of you to think about the despondent air of apathy which has held our school entrapped for the past few years. The response I have received sweeps all the way from livid anger to definite agreement. Unfortunately neither livid anger nor definite agreement communicates any course of corrective action . . . but then neither did my original letter.

Some of the symptoms of this apathy are:

1) Little active school spirit
2) Small interest in the engineering school beyond attending classes
3) Small interest in engineering beyond how much money it is going to make me when I graduate

These conditions need not exist either as symptoms or problems. You who are faculty and administration know this to be true. You who have been here longer than three or four years know this to be true.

What can be done to increase school spirit, interest in George Washington University School of Engineering and Applied Science, interest in Engineering? Have you any ideas?

Here are some of mine:

1) Free Friday night on campus
   a) two kegs of beer
   b) free from 5:00 P.M. until beer runs out
   c) for students, faculty and staff of the engineering school only
      1) identification by student I.D.
      2) one guest allowed
   d) funding by the Engineer's Council
   e) to be held at the D-H House
2) Formation of small discussion groups concerning existing problems in the engineering school with the hopeful intent of drawing more students concerned with the present state of affairs into helping to define and attack these same problems
3) An Engineers' picnic each semester
   a) fall semester-early
   b) spring semester-late
4) In the front lobby, displays of great historical Engineering Feats
   a) one each week during the school year
   b) suggested by members of the faculty
   c) built or presented by students
   d) an award for the best suggestion
   e) an award for the best presentation

Lindsey, Page 26, Col. 2

TAU BETA PI

by Paul Johnson
Perry Saidman

The Tau Beta Pi Association, national engineering honor society, was founded at Lehigh University in 1885 by Dr. Edward H. Williams, Jr., to offer appropriate recognition for superior scholarship and exemplary character to technical students and professional persons. Since 1885, Tau Beta Pi has grown to be a vital force in the engineering world, with collegiate chapters at 121 institutions, alumnus chapters in 31 cities and a total initiated membership of over 135,000.

OBJECTIVES

The two main objectives of Tau Beta Pi, as stated in the Preamble to the Constitution, are "to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as undergraduates in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges."

In fulfillment of the first aim, Tau Beta Pi's Collegiate chapters twice annually elect to membership those students and alumni who have demonstrated their ability to learn well and their appreciation of standards of character.

The second objective is based on the belief that the acquisition of technical knowledge alone is insufficient preparation for engineering, that, to meet the challenges of the profession, engineers must also be liberally educated. Tau Beta Pi recognizes the value of the humanities and the arts, and discourages specialization that ignores those subjects which are helpful to the progressive man.

MEMBERSHIP REQUIREMENTS

High scholastic achievement or eminent professional attainment is the first eligibility requirement for Tau Beta Pi. Engineering students whose academic standing is in the upper eighth of the junior class or the upper fifth of the senior class have earned consideration for membership.

The District of Columbia Gamma Chapter of Tau Beta Pi here at GW has instituted additional academic requirements for membership in the local chapter. First-semester juniors must have QPI's of 3.50 or higher, and seniors and second-semester juniors, 3.00 or higher, to be eligible for membership.

The second eligibility requirement for Tau Beta Pi is exemplary character, which includes personal integrity, breadth of interest both inside and outside of engineering, adaptability and unselfish activity.

Personal integrity transcends every other qualification for membership. A variety of interests, the ability to adapt ingeniously to changing conditions, and a willingness to devote time and effort to worthwhile causes are also requisites for high professional standing.

Each student elected to membership is required to write an essay, preferably on a nontechnical subject, for submission to his chapter. The papers are judged by the chapters, and the best one from each is entered in national competitions held semi-annually. The winners of the national competitions are awarded cash prizes and their essays are published in the Association's magazines. Doug Lowe of D. C. Gamma won a national first prize in the spring, 1965, contest.

The Tau Beta Pi Constitution states that "an undergraduate student shall not be initiated into membership if he is yet required to do more than seventeen months of strictly academic work." D. C. Gamma determines the amount of work a student has left by the expected date of graduation shown on the Dean's card filled out at registration.

On Sunday, November 20, 1966, the District of Columbia Gamma Chapter of Tau Beta Pi at George Washington University held their initiation ceremony and celebrated at a banquet at which Dr. Lloyd H. Elliot, President of the University, was the honored guest and speaker.

INITIATION

Those accepted for membership this fall included one first semester junior, two second semester juniors and four seniors. In that order they are John Cavanaugh, Lee Danisch, William Lemeshewsky, James Diehl, Robert Ayre, Garner Lewis, and Edward Murray.

Also present at the banquet, which was held at Tom Sarris' Orleans House, were Dean Martin A. Mason and his wife and Professor Raymond Fox and his wife. Both Dean Mason and Professor Fox are members of the chapter's advisory board. We offer congratulations to the new initiates and continued success.

UFO–NATURAL PHENOMENA OR STRANGE VISITORS?

by Shari Partin

Are unidentified flying objects extraterrestrial visitors or can they be explained as a natural occurrence? The National Investigation Committee on Ariel Phenomena (NICAP) supports the former theory. Based on a compilation of more than 700 reports of UFO sightings, entitled "UFO Evidence," their official opinion is that UFO's are "manifestations of extraterrestrial life." Philip Klass, senior editor of Aviation Week and Space Technology, has found their report full of flaws, however. In October, after five months of intensive study of the NICAP papers and numerous interviews with experts in the fields of astrophysics and plasma physics, he published a detailed rebuttal of NICAP's claims. His aim was to prove that the facts they were using to support their conclusions substantiated his.

Klass' theory, simply stated, is this: Most UFO's are plasmas of ionized air containing charged particles of dust or ice. Examining each NICAP contention individually, he showed how well it explained his theory.

According to NICAP data, UFO's vary in shape, size, and color. Klass pointed out that the same effects can be achieved in the laboratory. At the University of North Carolina, plasmas were created artificially for demonstration purposes in a partially evacuated glass tube with electrodes at either end. The technicians noted that, by simply varying the voltage applied to the electrodes or by moving a hand along the tube, they could induce a change in the color or shape of the plasma.

So-called "intelligent control" played an important role in the NICAP theory. Many UFO's were observed to defy Newton's laws of inertia. They would be travelling at an incredible rate of speed when they would abruptly make a 90° turn or stop and reverse direction in an instant. Some were allegedly as large as jetliners. If they were plasma, however, this inconsistency could easily be explained. Although the general size of the object was large, its constituent particles were minute in size. Each one was capable of executing a change in direction within seconds.

People who reported having seen a UFO noted one characteristic time after time. As an Illinois man observed, "it seemed to go out of sight, disappear or disintegrate." NICAP attributes this characteristic to intelligent control also. From data gathered about plasma lives, it was learned that this "disappearance" is only an optical illusion. It occurs when the energy loss was sufficient to cause the luminous quality to end. Then the plasma will take on the appearance of the air surrounding it.

A third characteristic thought to indicate intelligent control is the unusual behavior exhibited by UFO's being pursued by a jet fighter. The UFO will sit and wait until the plane has nearly closed in, then it will dart away. The sequence is then repeated. To Klass this behavior merely illustrated a well-known physical law: objects of opposite charge attract, those of identical charge repel. Aircraft fuselages carry a charge acquired on impact with charged vapor and dust particles in the air. If the charge on the plane is different from that of the plasma the two will be attracted and vice versa. In some instances, the force of attraction is so weak that the UFO is dragged along just outside the aircraft windstream by electrostatic forces in the vicinity of the plane, appearing very much as if it's flying in formation.

To quote "UFO Evidence," "in general, a blip on a radar screen always corresponds to a reflection off some solid (or liquid) substance. . ." Not so says Klass. Plasma generates a stronger echo than a solid object of the same proportions. A rocket re-entering the earth's atmosphere produces a weaker signal than its plasma wake.

Finally, Klass wonders why, if these are signs of extraterrestrial life, no UFO's have been detected outside the atmosphere. Not even the extensive network of United States Air Force radar has spotted any -- and they are capable of picking up the tiniest scraps that are in orbit.

Philip Klass feels certain that his theory will eventually be verified and accepted by the scientific community in general. He attributes the lack of research in this area thus far to skepticism on the part of his colleagues. Scientists have long regarded UFO's as "the work of crackpots" and "unworthy of a thinking man's mind." Because they were not looking for a rational explanation of the phenomenon, the "plasma fingerprint" has been noted only recently.

Although the Klass theory is logically and concisely drawn from proven scientific fact, there are some who refuse to accept it even as a possibility. Foremost among the doubters is J. Allen Hynek, who in his capacity as astrophysicist at Northwestern University and official UFO consultant to the United States Air Force, has spent eighteen years studying unidentified flying objects. He is wary of ruling out the extraterrestrial contention just yet. In an interview with Newsweek last month, he is quoted as saying: "It would be provincial to believe we are the only intelligent beings in the universe. (UFO's might even be) something entirely new to science. Where would you have gotten in 1886 if you had talked to a scientist about nuclear energy?"

There are countless people who support both sides of the issue. Who is right is a point that no one can judge with any degree of certainty. The only means of positive identification of these baffling phenomena will be achieved through extensive research and experimentation. Laboratories such as the one at North Carolina University are working with man-made plasmas to increase scientific knowledge of their properties, but this is only a first step. Klass and his detractors are in agreement on one thing at least: there is a great need for new methods of data collection. They feel that this could perhaps be achieved if a scientific organization with no preconceived ideas could do the collecting. Or a new reporting form designed to elicit facts essential to scientific experiments could be administered to those who see the UFO, but are not scientifically trained.

Radar is the shortened name for a method of gathering information based upon the speed at which electro-magnetic radiation travels in free space.

Detection is accomplished by directing a narrow high power beam of microwave energy at a target then using a sensitive receiver to detect the reflected signal.

Ranging is accomplished by measuring the time that pulse of microwave energy takes from transmit to receive. Since the velocity of electro-magnetic radiation in free space may be considered to be a constant

$$S = VT$$

may be reduced to

$$S \quad T$$

such that

One radar range mile (Nautical Mile) is roughly equal to 12.6 micro-sec. which is the total travel time of a pulse of energy out and back from a receiver-transmitter (R-T unit) to a target. (See figure 1.)

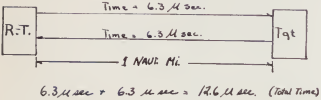


Figure 1

A Brief History of Radar Development

Before the turn of the century the optical character of radio waves was predicted by Herty.

-1904- Hubsmeyer, a German Engineer obtained the first patent for a navigational aid and obstacle detector for ships.

-1922- Marconi urged the use of short wave radiation for detection.

-1925- Brect & Tuve of the Carnegie Institution of Washington were the first to use the pulse technique for ranging in the study of ionospheric height detection.

-1935- Independent development in America, England, France and Germany of successful pulse radar systems.

-1938, March- First early warning system against aircraft emplaced in the Thames estuary.

-1939- First airborn air intercept radar systems installed in British fighter aircraft.

-1940- British development of the multi-cavity magnetron.

-1941- U. S. Navy installed the first long wave search and medium wave fire control radars aboard ship.

-1941, June- First automatic tracking of an aircraft by the U. S. Army.

The Radar Industry grew from nothing in 1940 to a production output in the United States alone of $100 million worth of radar equipment per month in 1945. By the end of June 30, 1945 about $2.7 billion of radar equipment had been installed or delivered to the U. S. armed forces.

The Hardware of the System

Although there are varying degrees of complexity and sophistication of radar equipment the heart of each is the basic radar configuration shown in figure 2. Such as it is, an understanding of the basis radar is a necessity to the complete understanding of any system of which a radar is a part.

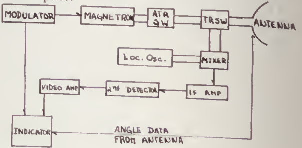


Figure 2

Modulator -- initiates the entire radar sequence with the first pulse to the magnetron.

Magnetron -- high power transmitting oscillator (resonant cavity type).

ATR switch -- (alternate transmit-receive switch) blocks the wave guide to the magnetron, insuring that all of the return pulse goes to the mixer.

TR switch -- blocks the receiver wave guide to the mixer so that the sensitive crystals will not be burned out by the high power transmit pulse.

Mixer assembly -- heterodynes the local oscillator and receive waves to form the intermediate frequency.

Second detector -- removes the intermediate frequency leaving only the video information for amplification and display.

Indicator -- usually a direct view cathode ray tube.

Some of the specific uses for equipment using the basic radar principal are:

1) Mapping
2) Weather
3) Missile & Missile detection
4) Fire control
5) Bomb laying
6) Terrain clearance
7) Navigational aids
8) Upper atmospheric research
9) Aircraft ground control

The majority of recent improvements in radar systems have come as a result of extreme specialization primarily in the military fields of missile detection and intercept.

RANGING - A REVIEW

by John W. Lindsey

Problems

A major problem in high-altitude radar work has been that of scope wash out due to bright incident sunlight on the face of the cathode ray tube. In the past the pilot of high altitude intercept aircraft have had to wear or look through a variety of hoods, shrouds and such other related equipment as was deemed necessary to prevent this from happening. A solution to the problem which allows for better radar interpretation is the direct view storage tube.

The direct-view storage tube has been developed in answer to some of the more insistent problems encountered with conventional cathode ray tubes, some of which are:

1) low screen intensity
2) tendency for the screen to wash out under high ambient lighting conditions
3) poor definition of half-tones
4) speed of image degradation

The DVST provides both long controllable displays coupled with exceptionally high light output. It is capable of displaying a number of shades of grey as well as black and white. The storage time which for a typical tube ranges from fifteen seconds to 13 minutes is defined as the time required for background brightness to increase to a specific percentage of the maximum light output of the tube.

The high intensity, half-tone definition and good image retention are the result of a division of labor within the tube as illustrated by the diagram.

The target (storage grid) is a fine mesh screen somewhat like the mask in a color TV tube; it is positioned about 1/4 inch away from the screen. When the high velocity write beam strikes the storage grid the effect of secondary emission leaves a net positive charge. The collector grid removes the slow moving secondary electrons preventing them from returning to the storage screen at points where writing has left a net positive charge, flood electrons pass through and are rapidly accelerated toward the screen by a high voltage. Because the viewing electrons are supplied continuously to the screen the image is exceptionally bright.

Another problem has been one of beam shape and control - a function of the antenna. These problems coupled with other mechanical problems incurred in normal antenna design have caused the armed forces to turn to a revolutionary technique called Phase Array Radar.

It solves a multitude of problems in every application of radar design:

1) eliminates antenna inertia
2) provides positive beam control
3) allows for multiple track and search functions with a single radar system.

The concept of phased arrays has been in use since the first radio station direction by using two antennas driven by signals of slightly different phase. The more modern version makes use of the same concept with an increase of antenna number.

A good example of the number of antennas used is that of the first full scale phase array antenna which had slightly less than a thousand mounted in the face of the array in box

Transmitter - receiver

The phase angle of each antenna with respect to each of its adjacent partners is a combination of the respective column (θ) and now (ϕ) phases. (See figure 3.) If these phase angles are all zero the beam emitted from the array will be perpendicular to the plane of the array. By varying the phases of the columns with respect to each other the beam is directed to the right or left of perpendicular. By varying the phases of the rows the beam is directed up or down with respect to perpendicular.

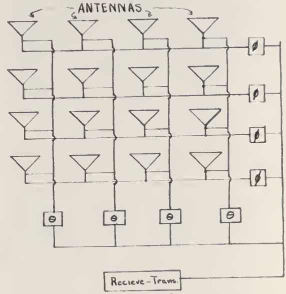


Figure 3

It is possible, using computer control of each phaser, to drive all antennas together or in groups separately. This allows a multitude of functions to be performed simultaneously with the computer both directing and recording the inputs and outputs of the system. Individual beams may be formed by the computer in micro seconds whereas a physical antenna would have problems changing direction and achieving track in milliseconds.

There are more developments in the field of radar and electronic surveillance which can ever be listed between two covers. Improvements occur daily on existing theory and equipment and most of these are extremely interesting.

This article is no more than a very brief review of some of what is and has been happening in this field. The intention is to generate enough interest so that you will take time to look for yourself.

FISH AND OTHER FOODS

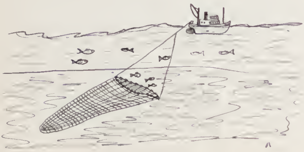
FROM THE SEA

by Louise Cherry

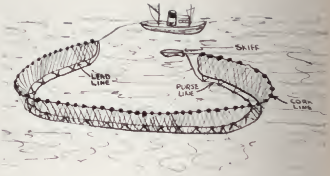
One of man's most urgent problems is providing enough food for the world's growing population. Because the limit of food production on land has almost been reached, it soon will be necessary for man to turn to the sea as a source of food. The sea already accounts for a large amount of man's food; twenty million tons of fish alone are consumed each year, and the total harvest of sea foods is estimated at twenty-nine millions of tons each year. Food production from the sea can be increased in the future to match the growing population if more is learned about the science of oceanology and about improving the techniques of fishing.

Modern fishing techniques encounter many problems, from just locating schools of fish to the methods of catching them. While much time is wasted in locating fish, even more time is consumed in following the schools. Although both electronic fish finders and aircraft are used to find fish, both are limited in scope and are expensive. The two categories of catching fish are the passive method, involving spreading nets, hook and line, rakes, and shovels; and the active method, involving baiting and dragging nets.

The two most popular nets are the otter trawl and the purse seine. The otter trawl is dragged across the sea's floor in areas of large fish concentration; three drawbacks are recognized: the net is frequently damaged by rocks; many fish are able to escape the net; the fisherman does not know what fish he is catching until the net is surfaced. In contrast to the otter trawl, the purse seine is one of the most efficient nets used today. Once a school of fish has been sighted, the ship sends out a skiff dragging the end of a long net. As the skiff circles the school, the purse line along the bottom edge of the net is tightened, and the net, which is filled with fish, is brought over the rail and dumped into the hold.

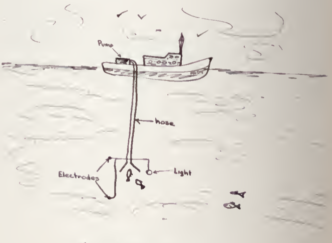


The Otter Trawl



The Purse Seine

New methods of catching fish are being developed as a result of the studies of spawning grounds and migration patterns of fish, and of the biological rhythms which partially control the life patterns of all organisms. Along the Asian coast, fishermen catch a young fish and release it into a pen built on the shore line; enough food floats in with the currents and tides for the fish to grow to maturity, when it is harvested. An electronic device is being developed in West Germany by the International Electronics Laboratory of Hamburg but is not, as yet, commercially used. Fish can be brought in an electric field and forced to move in the field's direction. The fish are first attracted to a light at the end of a long hose; the electronic field is used to accelerate the fish towards the hose, which then sucks them up into the hold. Despite new and improved processes of fish catching, the real hope for food production from the sea is found in farming the oceans.



A New German Type of Fish Trap

New methods of farming the oceans are being developed as a result of studies of the chemical and physical properties of oceans and their inland

branches. The sea has a high content of minerals required for protein production. If research can find the proper conditions for growth of animals and plants commercially, the marine farm could be very profitable. However, at present, pollution remains a very serious problem. For many years, man has been wasting his water supply by dumping refuse into the oceans and inland bodies of water, and the situation is becoming increasingly critical. The potential production of plants and animals in the sea is high, and the raw materials are present. Man must only supply the knowledge to unlock the secret of future food production.

KASTNER—from Page 6

nontechnical aspects of the present curriculum must remain as a significant part of that program.

Speaking for professionalism, it was decided that the demands here too have grown and will surely not diminish in the future. As technical knowledge has increased, the need for very high levels of technical competence has become evident.

Reflecting on the need for a higher level of professionalism, the National Council on Creative Engineering made this statement: "It is doubtful that engineering, in this noble sense, can be taught adequately below the graduate level; in any case, the engineering schools should plan and structure their graduate programs with primary emphasis on the preparation of M.S. and Ph.D. graduates in the art of creative engineering."

Forward-looking schools are beginning to recognize three things. The first is that the traditional four-year engineering curriculum logically has become a broadly-based liberal science curriculum of increasingly diverse and general nature and it will more than likely continue to develop along these lines.

Secondly, the practice of engineering today, and in the future, demands a high level of professional competence which can best be achieved through study at the graduate level.

Finally, the growing interrelationships of all branches of knowledge can best be served by providing engineers with an integrated and sequential program of study.

The article holds that, if present trends continue, by 1976 at least one out of every two bachelor graduates will go on to a master's degree and one in twelve will continue through to a doctorate. Looking further, in 25 years every engineer may be holding a master's degree. Employers want more and more engineers with graduate degrees and the students are responding to their needs.

In light of the above facts and personal observation, I offer the following conclusions.

First, leadership ability can be developed only if the students present themselves in organizations or activities requiring personal responsibility.

Second, only the foundations of creative ability and success can be acquired on the undergraduate level.

And finally, development of true professionalism is reached only after study at the graduate level and having had several years of experience in your engineering field.

For the most part, I feel that the SEAS is striving to fulfill its obligations to the students. It is up to us to see that the school succeeds.

/s/ Lawrence J. Kastner, Jr.

YOUNG—from Page 6

since there are a wealth of topics available. One possible topic is the new structure in our school and what the change means to the student, another is the curriculum that will probably be forthcoming since we now have departments. Some student or group should step forward and fulfill this need.

The societies need to be given another chance by the students. Many students have written the societies off as not serving any useful purpose. They need to take another look at IEEE, ASME, and ASCE and see how they have changed. The societies are trying to bring useful and understandable information to the student. Professors are also encouraged to take a greater part in the societies.

One of the things that must be done, and soon, is to increase the size of the freshman classes. They have been entirely too small for several years. This is also the national trend, but new tactics should be tried.

As an initial suggestion, let us go to the student in his high school with a team of professors and engineering students and tell them why they should come to GWU. Let us personally invite them to come to our Engineers' Week and see what we have to offer.

Another idea would be to send out a strong recruiting pamphlet to all of the counsellors in the area. Again the students would be invited to Engineers' Week.

Similar intensive recruiting was tried by Washington University in St. Louis, Missouri, a school very similar to ours. The results were encouraging. In the first year they increased the size of their freshman class by 30 percent while ours decreased.

Of course Engineers' Week would have to be changed somewhat to fill this new need. The groups that could most easily aid in arranging for the proper displays, speakers, and demonstrations are the engineering societies. I am not saying that these are the best ways of attacking the problems. But they are possible ways.

Young -- Page 26, Col. 1

FACULTY SPOTLIGHT

by Perry Saidman

This month the faculty spotlight shines on another new full time faculty member, a Ph.D. in Electrical Engineering who has taken upon the task of initiating a new program of Medical Engineering here at G. W., Dr. Marvin F. Eisenberg.

Dr. Eisenberg was born in New York City, grew up in Miami, Florida, and attended the University of Miami where he obtained his BSEE in 1953. He received his MSE at the University of Florida in Gainsville in 1954 while a graduate assistant in the School's Ionics Research Laboratory. He then served two years in the U. S. Air Force as a First Lieutenant at Eglin AFB heading a project team which planned, conducted and evaluated ground and airborne tests of aircraft bombing systems. In 1956 he joined the research staff of Johns Hopkins University then working on radar analysis systems. He returned to the University of Florida in 1957 to help plan and design their 10 MEV Linear Electron Accelerator Project with the Department of Nuclear Engineering. While continuing on that project and gaining teaching experience as an Instructor in the EE Department, Dr. Eisenberg worked on his Doctoral Dissertation entitled "A Post-Acceleration Klystron Linear Particle Accelerator" which he completed in 1961.

Prior to his undergraduate career Dr. Eisenberg had been undecided as whether to study pre-medicine or engineering, since both fields interested him. Now, after obtaining his Ph.D. in Electrical Engineering, he seized the opportunity to combine his interests and in 1964 accepted the position of co-director of the Visual Sciences Laboratory at the University of Florida. He actually helped plan and establish the Laboratory as a joint project between the J. H. Miller Health Center and the College of Engineering. His primary field of work was instrumentation for and research on bioelectric visual responses. In 1964 he was also given a grant by the National Institutes of Health as the principal investigator on "Measurement and Evaluation of Visual Evoked Responses". During this time, Dr. Eisenberg also had attained the position of Assistant Professor in Florida's EE Department and had developed the Biomedical Engineering academic and research program while teaching various EE courses. From 1963 until coming to SEAS this fall, he was with the Department of Industrial and Systems Engineering where he established and directed the Systems Engineering Laboratory containing analog and digital facilities.

At SEAS Dr. Eisenberg plans to initiate Medical Engineering courses as a minor field of study in both the undergraduate and graduate curricula. He says the courses will be aimed towards "trying to develop better engineers in the respectful engineering areas with a sufficient knowledge of medicine so that they can communicate with medical people". The program is now being formulated in conjunction with Dr. Richard C. Fowler of the Department of Medicine. Dr. Eisenberg is also currently heading two projects in this field, one of which is developing an economical Cybernetic Translator which is tabbed as "a device which will translate what limited motion a handicapped person has into necessary motion to do a useful job, such as typing". The other project is the development and clinical application of visual evoked potentials as an aid in medical diagnosis.

Dr. Eisenberg is married, has two children, enjoys photography and good music as hobbies, and has been an active ham radio operator since he was 13 years old. He currently teaches courses in control theory, circuit theory, and computer programming. He is "firmly in favor of a simplified grading system", stemming from his view that the whole learning procedure should be enjoyable while emphasizing understanding, not grades.

His words on an engineer's education: "I look at engineering as primarily an applied field- it is the job of the engineer to produce a useful system or device. I think it is the job of the engineering education to develop the engineer to develop the system. In an undergraduate's education there is too much emphasis on theoretical knowledge and not enough applied teaching and applied experience".

We welcome Dr. Eisenberg to SEAS and look forward to the new curricula of Medical Engineering. Dr. Eisenberg invites any interested students to speak with him regarding this program.


STATE

NEWS
1966
for
1967
ENGINEERING GRADUATES

CAREERS WITH BECHTEL

J. GEORGE THON, *Manager of Engineering, Hydro and Transportation Division*

CIVIL, MECHANICAL AND ELECTRICAL ENGINEERING

One of a series of interviews in which Bechtel Corporation executives discuss career opportunities for college men.

QUESTION: *Mr. Thon, the graduate considering a position with the Hydro and Transportation Division of Bechtel is interested primarily in two things: nature of the overall work the Division does, and what his starting assignment would be.*

THON: In the Hydro and Transportation Division, as our name implies, we cover two fields of engineering and endeavor—each one challenging to the engineer but with a different emphasis. Briefly, in Hydro work we design and manage construction of dams, hydroelectric powerhouses, tunnels, and water collection systems. In this work we integrate efforts of Electrical, Mechanical, and Civil Engineers in the design of a complete project. In Transportation work we study, design, and manage construction of rapid transit systems in metropolitan cities. A graduate would start either as an assistant engineer in a specific project group or as a member of one of the Hydrology, Hydraulics, or Soils supporting groups. In an electrical group he might start working on one of the radically new systems of electrification or automatic train control presently under development. Similarly, in a mechanical group he might work on the evaluation of hydraulic turbine efficiencies or a ventilation system for an underground station. As you can see, a wide range of disciplines is covered.

QUESTION: *Would he have any choice as to preliminary assignment?*

THON: Yes. Both college training and personal preferences are considered in making an assignment.

QUESTION: *Since Bechtel not only engineers a project but usually manages construction as well, I assume there must be close liaison between engineering and construction forces.*

THON: That is right. It is of paramount importance at all times. We emphasize the need for this close relationship in the work of the young engineer. He is shown why he must learn both design and construction before he produces a design that not only is theoretically sound but also economical. He is given frequent opportunities to visit project sites. Transfers to construction are also made available.

QUESTION: *How long does this training period last?*

THON: There is no pat answer to that question, since so much depends on individual ability and intensity of application. If I were to generalize, I'd say three to four years.

QUESTION: *Can the young engineer supplement the company's training program in any way?*

THON: Yes. We recognize the value of university extension courses in specialized fields. He is encouraged to enroll in such courses to broaden his knowledge, and we have a policy of reimbursing him for tuition fees and incidentals.

QUESTION: *To what does he "graduate" at the end of his training period?*

THON: He would be put in charge of one of the phases of a project. For example, he might take over a group designing one of the many types of dams, from a double curvature, thin arch dam to an earth or rock fill dam. He might be responsible for a group analyzing water hammer problems in pipelines or penstocks, or be running an economic study for a regional water collection system. In the Transportation Group he might head up a design team for a Rapid Transit station in the center of a large city, coordinating his work with architects and local officials. As a mechanical or electrical engineer, he might be in charge of design of a pumping station or the preparation of a hydroelectric generator specification. I think you will see from the few aspects that I have mentioned that there is no lack of variety in our work. We like to think we are a young man's company.

The Hydro and Transportation Division is one of eight major divisions of Bechtel Corporation. Additional opportunities are available in the Power and Industrial, Mining and Metals, Refinery and Chemicnl, Pipeline, and the two International Divisions.

The engineer seeking professional challenge and opportunity and wishing to work on projects of national and international economic effect, will find interesting beginning assignments and career opportunities in the dynamic areas of Bechtel Corporation's activities.

Bechtel Corporation (and its foreign subsidiaries) designs, engineers, and constructs in addition to water supply, hydroelectric projects, and urban rapid transit systems: conventional steam and nuclear power plants, mining and metallurgical processing projects, industrial plants, food processing plants, missile and space development programs, petroleum refineries, petrochemical and chemical plnnts, pipeline systems, community and regional planning, and developmental research in all these areas.

Engineers are employed from many branches of the engineering profession including chemical, mechanical, electrical, civil (structural and hydro), mining and metallurgical, architectural, nuclear, instrumentation and automatic control. Positions nre also available for graduate engineers with Masters' Degrees in Business Admintration.

Write for new brochures showing the wide variety of projects Bechtel builds throughout the world.

Address: Richard S. Jamar, Jr.
College Relations
P.O. Box 3965, San Francisco, Calif. 94119

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hip chip

What is it?

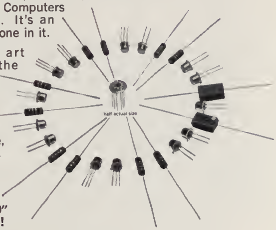
Not the op art discs — we're not about to describe them. We are interested in the micro-photo just above — specifically the little rectangle in the center. It's a minuscule chip of silicon produced in Motorola's semiconductor labs—on the verge of creating a scientific revolution all its own.

The chip's dimensions are 0.060" by 0.080"—about the size of a baby B-B. That tiny area incorporates 14 transistors, 10 resistors and 2 capacitors—performing the same circuit functions as the 26 discrete components shown below. It's Motorola's chip off a new block of electronics—it's an integrated circuit.

But why all the fuss?

Because the integrated circuit is the key to untold electronics marvels, hitherto impractical. Because its small size, weight, and power consumption lessen the cost of complex systems and improve performance. Because it's more reliable, to boot.

Integrated circuits already are used in design plans for amazing new computers — computers which will, in effect, function as special extensions of the human brain. Computers which, in time, will almost think. It's an exciting business. It challenges everyone in it.



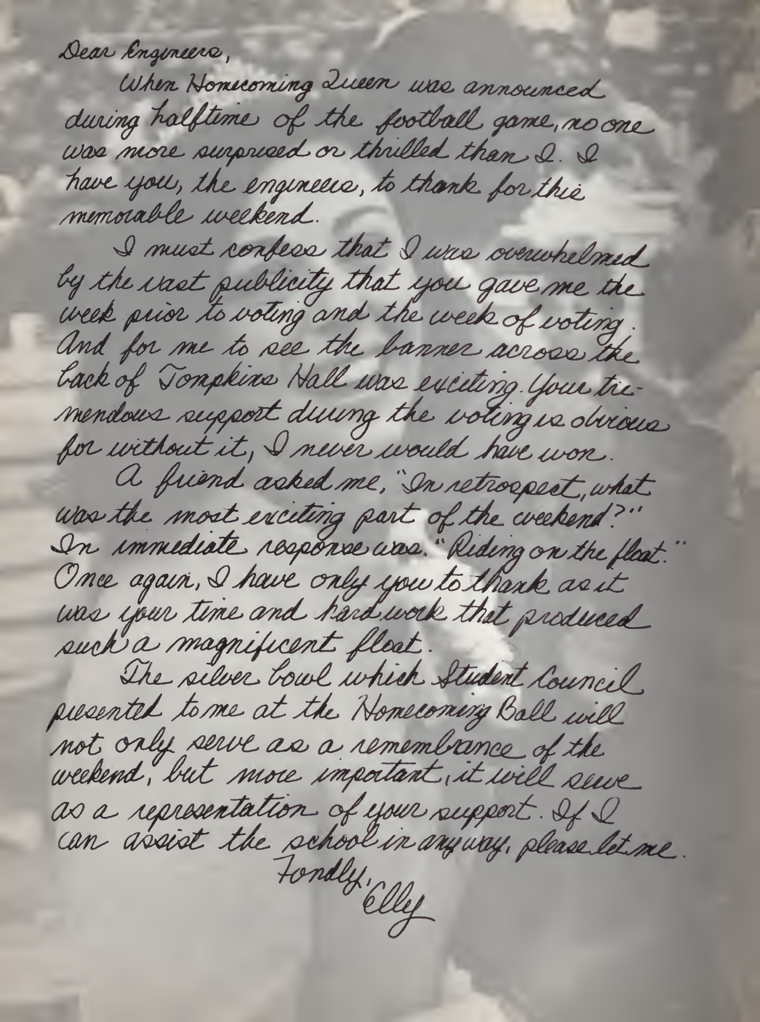
Within a year, the solid state art will develop the means to store the content of the Encyclopaedia Britannica in a one inch cube—a solid state memory system. One day, every important university library will have electronic knowledge banks connected, perhaps by satellite, for instant exchange of information.

People generally are impressed by the chip with 26 components. But hang on. We've now got one in the lab not much larger (0.120" by 0.120") **. . . with 524 components!**

Hip chip? You bet.

TRUST THIS EMBLEM WHEREVER YOU FIND IT

MOTOROLA



Dear Engineers,

When Homecoming Queen was announced during halftime of the football game, no one was more surprised or thrilled than I. I have you, the engineers, to thank for this memorable weekend.

I must confess that I was overwhelmed by the vast publicity that you gave me the week prior to voting and the week of voting. And for me to see the banner across the back of Tompkins Hall was exciting. Your tremendous support during the voting is obvious for without it, I never would have won.

A friend asked me, "In retrospect, what was the most exciting part of the weekend?" In immediate response was: "Riding on the float." Once again, I have only you to thank as it was your time and hard work that produced such a magnificent float.

The silver bowl which Student Council presented to me at the Homecoming Ball will not only serve as a remembrance of the weekend, but more important, it will serve as a representation of your support. If I can assist the school in any way, please let me.

Fondly,

Elly

A Lot of Work

E = MC

(Engineers = Much Commotion)

This year S.E.A.S. decided to build a float with the help of the Engineering Alumni. This float, "The Apples of Your Eye" won first place in a special division and was the Transportation from the School to the Stadium for the Queen candidates. Thanks to all those who helped.

A Few Questions

A Little Fun

It Isn't So Bad

Voila, a Winning Float

MECH

MISS . . .

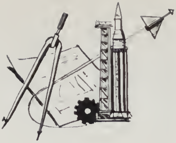
This month's Mech Miss is Rosemary Murphy, an eighteen year old sophomo majoring in history. This 5 ft. 6 in. coed commutes daily from nearby Sumner Maryland.

While at G.W., Rosemary has been on the Queen's Committee for Homecomin and is a member of Kappa Kappa Gamma Sorority. Her friendly smile and warm personality are a bright addition to the G.W. campus.

Photography by Mike Murphy

Rosemary Murphy

TECH NEWS



by Doug Taylor

TURBO-TITAN III

The new Chevrolet Turbo-Titan III combines highly advanced styling with the unique characteristics of the gas turbine engine and the proved potential of an existing chassis design.

Mounted on a slightly modified truck chassis, the modernistic cab has a power tilting mechanism. At a touch of the switch, the cab lifts forward to reveal the gas turbine engine.

Inside the cab the dial steering system is mounted on a pedestal in front of the driver in place of the conventional steering column and wheel. Twin dials mounted on a vinyl padded panel operate at a feather touch to control the truck's power steering. An auxiliary pump, driven from the propeller shaft, provides emergency steering power if the main pump should become inoperative while the vehicle is in motion.

The quadrant for the automatic transmission also is mounted on this panel, as is the turn signal indicator. The pedestal pivots fore and aft and the panel also tilts for the most comfortable driving position.

The GT-309 engine is based on more than 15 years of research and development and is a fifth generation powerplant developed by the GM Research Laboratories. Successfully operating predecessors include turbines on the GM Firebirds, the Turbo-Cruiser bus, two Chevrolet Turbo-Titan trucks and 15 prototypes built by Allison Division for military and industrial users. The GT-309 produces 280 hp at an output shaft speed of 4,000 rpm, geared down from the power turbine engine and shaft speed of 35,000 rpm. Torque characteristics of a turbine engine are quite different from those of a reciprocating internal combustion engine.

Highest torque of the GT-309 is delivered at stall, an attractive feature for heavy-duty truck applications. The GT-309 has a maximum torque rating of 875 lb-ft. The colder the day the more powerful the GT-309. Ambient air temperature has the same effect on reciprocating engines, but to a lesser degree because of the smaller amount of air they require.

The GT-309 has the same basic operational components as previous turbines. These include a compressor, gasifier, power turbine, and regenerator. The gasifier turbine is mounted on a common shaft with the radial flow compressor. The power turbine is geared to the output shaft. Air is drawn in by the compressor, compressed, and ducted to the combustion chamber.

The compressed air, together with fuel sprayed into the chamber, produces combustion with temperatures of approximately 1,700 F. The gases, under high pressure and temperature, pass through nozzles against vanes in the gasifier turbine, driving the turbine and compressor at a design speed of approximately 35,700 rpm.

The power turbine is directly behind the gasifier but not connected to it. After driving the gasifier turbine, the high velocity gases from the nozzles strike against the buckets of the power turbine to drive it at various speeds ranging from stall to design speed of 35,000 rpm.

Internally, the engine is divided roughly into two chambers -- a high pressure plenum at the front containing the combustion chamber and a lower pressure exhaust plenum at the rear. In the passage between these are the turbines. Revolving on rollers is a drum-type regenerator which is gear and friction driven at relatively low speeds up to 30 rpm depending upon output shaft speed.

The regenerator is located so that one-third of its circumference and area is located, at all times, in the high pressure chamber and two-thirds of it in the exhaust plenum. Compressed air discharged by the compressor is heated as it is driven through the porous regenerator area located at that moment in the high pressure plenum.

The heated air goes through the combustion chamber, combines with the fuel, drives the turbines, and is exhausted into the low pressure plenum. These exhaust gases are cooled as they pass through the regenerator which then transfers this heat to the incoming air in the high pressure plenum, all in a continuous process.

Gas temperature coming out of the turbines is about 1,200 F. The regenerator absorbs enough heat to bring exhaust gas temperatures down to the 300 to 500 degree range, about half that of a diesel engine. More than 90 per cent of the recoverable exhaust system heat is salvaged. This reduces the amount of fuel needed to produce the high temperature, high velocity gas to drive the turbines. The regenerator eliminates the need for mufflers and silencers, serving as an insulating blanket to keep not only the heat but also most of the turbine noise from reaching the outside of the engine.

In most gas turbine designs, power is delivered only through the power turbine, while the gasifier turbine is used only to drive the compressor. The GT-309 has a performance advantage over its predecessors and most competitors with power transfer, a feature conceived jointly by GM Research Laboratories and Allison Division.

This system makes use of a gear train to couple the gasifier turbine and compressor to the output shaft. A variable coupling, or clutch, engages or disengages this drive to permit the transfer of only a scheduled amount of power.

During vehicle deceleration, power transfer provides two to three times more braking power than a comparable gasoline or diesel engine. In effect, it couples the output shaft to the turbine compressor but with about a 10-to-1 gear multiplication.

A further important feature of power transfer is that the vehicle can use engine braking incessantly without adverse effects. All heat created in the engine is immediately ejected into the atmosphere.

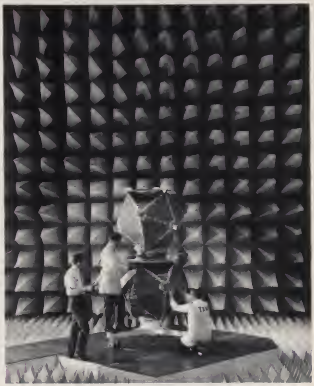
Since the power transfer train extends from the front to the rear of the engine, portions of the gear train can be used to provide both a front and a rear accessory drive. A pulley at the front end drives a complex made up of the alternator, the power steering pump, and the shrouded fan drawing air through the transmission-engine oil cooler. The rear power take-off drives the air conditioning compressor.

IBM REPORTS SCANNING LASER CONTROLLED BY ELECTRON BEAM

Three beams in a "scanlaser" are observed by Dr. R. A. Myers of IBM's Research Division. The new device generates different laser beam

directions inside the laser cavity under control of an electron beam in cathode-ray tube. The face of the cathode-ray tube is visible where the three beams end at the back of the apparatus in the photograph. In the foreground, the beams are emerging from a partially-transparent mirror that forms the other end of the laser cavity.

NEW ANECHOIC CHAMBER



One of the most efficient anechoic chambers in the United States has been built at TRW Systems in Redondo Beach, Calif.

The new chamber furnishes a shielded free space environment for testing microwave radiating or receiving systems. The 44 ton chamber measures 30 X 30 X 110 feet. The chamber design dissipates microwave energy at least 35 DB from frequencies to 100 MC and to 100 DB at 18,000 MC.

Technicians are shown setting up tests on the USAF's twin Vela Nuclear Detection Satellites. Six Vela satellites now orbiting the earth have accumulated over three-quarters of a billion hours of component operating time. They have also gathered some 400 billion bits of data in over 30,000 hours of actual data collection time.

HIGH CURRENT TRANSISTOR SWITCHES

PNP high current switches which offer for the first time the advantages of high beta and high voltage in an epoxy package are now available from Fairchild Semiconductor, and will be shown at the 1966 IEEE show in New York City.

The 2N3644 and 2N3645 are designed for digital and analog applications at current levels up to 300 milliamps; their high beta, high gain-bandwidth product at high current, and high breakdown voltage make them ideal for use in memory applications.

YOUNG—From Page 13

I hope that interested individuals will do the obvious; i.e., get together, make their ideas known, and above all act.

Lee R. Young
731 22nd St., N.W.
Washington, D. C. 20006
Phone 338-5610

Any replies are welcome at the above address.

HUM—From Page 7

students never know about activities due to poor publicity or lack of planning. Too many student activities seem to be passed around in a haphazard manner. The organizations are going to have to use Madison Avenue publicity techniques to "sell" their activities. Frankly, a great deal of unappreciated hard work by the student leaders and the faculty will have to be done in advertising and planning student activities, before the student body will support or initiate and such activities. I hope this is kept in mind next semester for Engineer's Week and in the student elections.

As for the last three questions, they cannot be taught in the classroom per se. The engineering curriculum as stated in the catalogue is aimed at turning out a technically competent engineer. However, technical competence is not the only point involved in living. The individual has to decide where the engineer stops and the human being begins. And this is a question of morals, ethics, and beliefs. These cannot be really discussed in the classroom or in a bull session. These are questions that only self-examination can answer.

In conclusion someone, faculty or "school leaders," has more work to do in addition to his regular school activities. Unfortunately, some one is going to have make some effort involving a great deal of work.

/s/ Spencer Hum

LINDSEY—From Page 7

- f) judging of finalists by the Dean and Chairman of the Engineering School
- g) final judging at the Engineer's ball by vote of those present

5) A display of an Engineering problem has yet to be solved
   - a) one each month during the school year
   - b) to be placed beside historical Feat
   - c) laboratory and professional aids for students attacking these problems
   - d) awards for students displaying creativity in solving these problems
   - e) awards for professors displaying creativity in solving these problems

These are just a few which come immediately to mind. Do you think they are good enough to be tried? Would you appreciate them if they were?

Do you feel that the money you are spending on an education is enough to warrant getting a good one? Do you feel that an education consists of no more than going to classes? Are you inert?

--John W. Lindsey

INDEX TO ADVERTISERS

CHAIRMAN NOTES

by John Lindsey

The other day down in the Engineering School library I was looking over the various copies of IEEE Transactions. I noted no fewer than twenty titles; perhaps there were more but I ran out of time. Some of the representative titles are:

Electronic Computers
Industry and General Applications
Automatic Control
Antennas and Propagation
Communication Technology
Aerospace and Electronic Systems

These are only a few of a myriad of publications which span every one of the areas included in the electrical field. It seems to me that anyone, freshman through professor, would be able to use these publications to maintain a current knowledge, but, judging by the immaculate condition of these magazines; much of this information is doing you no good -- because it is still in the rack and not in your head where it could be put to use.

For the student, the uses include:

1) A view to what you will be seeing after graduation
2) A concrete application for your present courses in engineering, math and physics
3) A morale boost to pull out of the doldrums which come and go during the process of an engineering education

For the professor, the uses include:

1) Ready references which provide concrete examples, homework and idea illustration for your students
2) Staying abreast of new techniques, attitudes, and ideas in industry which would otherwise never seep through the walls of the 'ivory tower'
3) Broadening of understanding of fields related to your's

If you don't have the time to stop by the engineering library or you would rather read the I.E.E.E. Transaction in the comfort of your own easy chair at home; you will be pleased to note that I.E.E.E. Student Membership costs only $5.00 per year and that one subscription to the Transactions only costs $1.00 additional for that same year. By receiving the transactions you will be able to improve yourself in an enjoyable way plus you will have a record of many of the more interesting things which occur in your field each year.

To see about getting your copies of the Transactions, contact Prof. A. C. Meltzer in room 408 of Tompkins Hall or John W. Lindsey at 338-5610 between 3 and 5:30 any day.

At Sikorsky Aircraft, it's *innovation*. Applying engineering ingenuity and imagination to wide-ranging commercial, industrial and military programs in our exciting world of aerospace.

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Sikorsky Aircraft DIVISION OF UNITED AIRCRAFT CORPORATION

STRATFORD, CONNECTICUT

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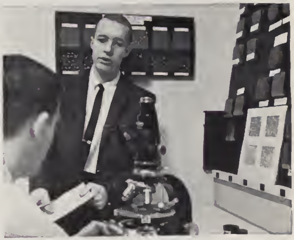

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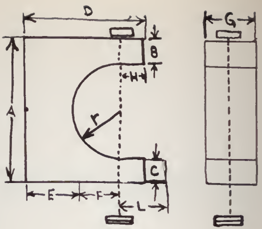
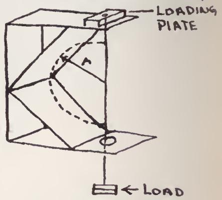
DESIGN CONTEST



Any Student in S.E.A.S. may enter.
Entries must be turned in at 9:15 at the D. H. House on Feb. 15, 1967.

Prize ⟶ Dinner for Two

TESTING



Rules:

A load will be applied in a vertical direction by a cable attached to the center of a loading plate. The plate will be of steel and will be 1 x 1/4 x 4 inches. The cable will pass through an opening in upper face of the structure and then through the lower face of the structure. The lower end of the cable will then be loaded until the structure fails.

a) Dimensions:

The structure must be designed so that no dimension will exceed those shown in the upper figure and so that a hemisphere of 5 in. radius may pass through the space between the loading wire and the structure.

$D \leq 10$ in.	$E \leq 3$ in.	$F \leq 5$ in.
$A \leq 10$ in.	$L \leq 3$ in.	B&C are arbitrary as long
$G \leq 4$ in.	$H \leq 1$ in.	as $A \leq 10$ in.

b) Materials -- Only Balsa wood and glue may be used. Glue may be used only in joining 2 pieces at a joint. All glue must be within 1/2 inch of the joint and may not be used to coat the wood. No paint, lacquer, shellac, etc. may be used. Laminations are not allowed. Total weight shall not exceed 1 pound. The structure must be able to support at least one pound.

Testing -- The structure will be weighed. The load will be applied gradually until the structure fails. (The point at which the structure can no longer carry additional load or the hemisphere can not pass between the structure and the wire.)

Judging -- The winning structure shall be the one with the highest load to weight ratio (i.e. the one with the largest ratio load/weight of structure).

Decision of judges is final.

Questions should be put in the D. H. House in the Mecheleciv mail box. (731 - 22nd St.)

Should man aspire to a nobler role?

The business press reports that many outstanding members of the Class of '66 have balked at entering industry.

Are we then to lie down and die for lack of smart new talent? No, thank you. We shall succeed in attracting high-ranking people from the Class of 1967 as we did from its predecessors on the country's campuses. We have no fear.

High-rankers are those who have demonstrated good grasp of the subject matter that scholars have gathered for them. The gathering must continue. Professors have an obligation to hang on to good gatherers. They are discharging it well. We too have an obligation. Ours is to lure high-rankers with their well grasped subject matter out into the world to put it to use. "Use" means tying it to the needs and desires of all kinds of people, everywhere. Which is what, at this particular stage in history in this particular land, business is all about.

Enough members of the Class of '67 will grasp that principle along with all the other principles they have grasped. They will therefore seize the opportunity to take over the mighty machinery built by charter-writers with 19th century minds and convert it to late-20th century needs. **Who else is there to put in charge?**

Those who feel motivation in that direction and want to taste the realities without, before, or during pursuit of advanced degrees will find Kodak a sound choice among the blue chips.

We do indeed fill genuine needs—teaching, recording facts, improving the effectiveness and efficiency of health services, putting better clothes on more backs and better food on more tables, and all the rest of the long, long chain of technological consequences from our well known original and still flourishing involvement with Sunday afternoon snapshooting.

Let's get together and talk over the more personal details.

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